

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

2964-0106P

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

097889495  
NEW

INTERNATIONAL APPLICATION NO.

PCT/SE00/00035

INTERNATIONAL FILING DATE

January 13, 2000

PRIORITY DATE CLAIMED

January 18, 1999

TITLE OF INVENTION

MECHANICAL WORKING IN THE PRESENCE OF A MULTI-PURPOSE COOLING LUBRICANT

APPLICANT(S) FOR DO/EO/US

SKOLD, Rolf

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1).
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
- a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
- b. ☒ has been transmitted by the International Bureau. WO 00/42135
- c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
- a. ☒ is transmitted herewith.
- b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4)
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
- a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
- b. ☐ have been transmitted by the International Bureau.
- c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
- d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☒ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 20. below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.-1449 and International Search Report (PCT/ISA/210) w/ 3 cited documents.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
14. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821-1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:  
Zero (0) sheets of formal drawings

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| U.S. APPLICATION NO (if known, see 37 CFR 1.5)<br><b>09/889495</b> |  | INTERNATIONAL APPLICATION NO<br>PCT/SE00/00035 |  | ATTORNEY'S DOCKET NUMBER<br>2964-0106P |  |
|--|--|--|--|--|--|

|  |  |  |    |        |  |
|--|--|--|----|--------|--|
| 21. <input checked="" type="checkbox"/> The following fees are submitted:<br><b>BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5):</b><br>Neither international preliminary examination fee (37 CFR 1.482)<br>nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO<br>and International Search Report not prepared by the EPO or JPO. .... <b>\$1,000.00</b><br><br>International preliminary examination fee (37 CFR 1.482) not paid to<br>USPTO but International Search Report prepared by the EPO or JPO ..... <b>\$860.00</b><br><br>International preliminary examination fee (37 CFR 1.482) not paid to USPTO<br>but international search fee (37 CFR 1.445(a)(2)) paid to USPTO. .... <b>\$710.00</b><br><br>International preliminary examination fee (37 CFR 1.482) paid to USPTO<br>but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... <b>\$690.00</b><br><br>International preliminary examination fee (37 CFR 1.482) paid to USPTO<br>and all claims satisfied provisions of PCT Article 33(1)-(4). .... <b>\$100.00</b><br><b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b> | <b>CALCULATIONS      PTO USE ONLY</b><br><br><br><br><br><br><br><br><br><br><table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%; text-align: right;">\$</td> <td style="width:40%; text-align: right;">860.00</td> <td style="width:50%;"></td> </tr> </table> |  | \$ | 860.00 |  |
| \$   | 860.00   |  |    |        |  |

|   |  |  |  |    |   |  |
|---|--|--|--|----|---|--|
| Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)). |  |  |  | \$ | 0 |  |
|---|--|--|--|----|---|--|

| CLAIMS  | NUMBER FILED | NUMBER EXTRA | RATE       |    |        |  |
|---|--------------|--------------|------------|----|--------|--|
| Total Claims  | 11 - 20 =    | 0            | X \$18.00  | \$ | 0      |  |
| Independent Claims                                    | 1 - 3 =      | 0            | X \$80.00  | \$ | 0      |  |
| MULTIPLE DEPENDENT CLAIM(S) (if applicable)      None |              |              | + \$270.00 | \$ | 0      |  |
| <b>TOTAL OF ABOVE CALCULATIONS =</b>                  |              |              |            | \$ | 860.00 |  |

|   |  |  |  |    |         |  |
|---|--|--|--|----|---------|--|
| <input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2. |  |  |  | \$ | -430.00 |  |
| <b>SUBTOTAL =</b>   |  |  |  | \$ | 430.00  |  |

|  |  |  |  |    |        |  |
|--|--|--|--|----|--------|--|
| Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)). |  |  |  | \$ | 0      |  |
| <b>TOTAL NATIONAL FEE =</b>  |  |  |  | \$ | 430.00 |  |

|  |  |  |  |    |        |  |
|--|--|--|--|----|--------|--|
| Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property + |  |  |  | \$ | 40.00  |  |
| <b>TOTAL FEES ENCLOSED =</b>   |  |  |  | \$ | 470.00 |  |

|  |  |  |  |               |    |  |
|--|--|--|--|---------------|----|--|
|  |  |  |  | Amount to be: | \$ |  |
|  |  |  |  | refunded      |    |  |
|  |  |  |  | charged       | \$ |  |

a. ☒ A check in the amount of \$ 470.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account. No. \_\_\_\_\_ in the amount of \$ \_\_\_\_\_ to cover the above fees.  
A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-2448.

**NOTE:** Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

Send all correspondence to:  
**Birch, Stewart, Kolasch & Birch, LLP or Customer No. 2292**  
**P.O. Box 747**  
**Falls Church, VA 22040-0747**  
**(703)205-8000**

**Date: July 18, 2001**

By Joseph A. Kolasch #32,868  
 Joseph A. Kolasch, #22,463

/REM

09/889495

JC18 Rec'd PCT/PTO 1 8 JUL 2001

PATENT  
2964-0106PD

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant: SKOLD, Rolf Conf.:  
Int'l. Appl. No.: PCT/SE00/00035  
Appl. No.: NEW Group:  
Filed: July 18, 2001 Examiner:  
For: MECHANICAL WORKING IN THE PRESENCE  
OF A MULTI-PURPOSE COOLING  
LUBRICANT

PRELIMINARY AMENDMENT

**BOX PATENT APPLICATION**

Assistant Commissioner for Patents  
Washington, DC 20231

July 18, 2001

Sir:

The following Preliminary Amendments and Remarks are respectfully submitted in connection with the above-identified application.

AMENDMENTS

IN THE SPECIFICATION:

Please amend the specification as follows:

Before line 1, insert --This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/SE00/00035 which has an International filing date of January 13, 2000, which designated the United States of America and was published in English.--

103120 5646350

**IN THE CLAIMS:**

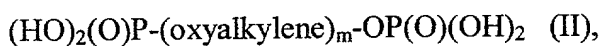
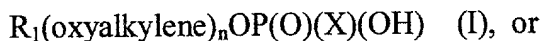
Please cancel claims 1-10 without prejudice or disclaimer of the subject matter.

Please amend the claims as follows:

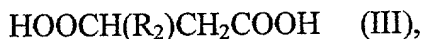
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## New Claims

11. A method for the mechanical working of metals and alloys, performed in the presence of an aqueous cooling lubricant having a pH of 6-10 and containing a phosphate ester of the formula



where  $R_1$  is an alkyl group with 1-12 carbon atoms, oxyalkylene is a group containing 2-4 carbon atoms,  $n$  is a number from 1-20,  $X$  is hydroxyl,  $R_1\text{O}$  or  $R_1(\text{oxyalkylene})_n\text{O}$ , where  $R_1$ , oxyalkylene and  $n$  have the meanings mentioned above, and  $m$  is a number from 4-40, or a salt thereof, and an alkenyl substituted succinic acid of the formula



where  $R_2$  is an alkenyl group with 4-10 carbon atoms, or a salt thereof, or a mixture of any of the compounds I, II and III.

12. Method according to claim 11 wherein  $R_1$  in formula I contains 2-8 carbon atoms, the group  $(\text{oxyalkylene})_n$  contains at least partially oxypropylene units and  $n$  is a number from 4-15.

13. Method according to claim 12 wherein the phosphate ester of formula I is  $n$ -butyl- $(\text{OC}_3\text{H}_6)_{10}\text{OPO}_3\text{H}_2$ .

14. Method according to claim 11 wherein the phosphate ester of formula II is  $(\text{HO})_2(\text{O})\text{P}-(\text{oxypropylene})_{8-15}\text{OP(O)}(\text{OH})_2$ .

15. Method according to claim 11 wherein  $R_2$  in formula III is octenyl, decenyl, diisobutenyl or tripropenyl.

16. Method according to claim 15 wherein the phosphate ester has the formula I, in which  $R_1$  contains 2-8 carbon atoms, the group  $(\text{oxyalkylene})_n$  contains at least partially oxypropylene units and  $n$  is a number from 5-15.

17. Method according to claim 15 wherein the phosphate ester is  $(\text{HO})_2(\text{O})\text{P}-(\text{oxypropylene})_{8-15}\text{OP(O)}(\text{OH})_2$ .

18. Method according to claim 11 wherein the total amount of compounds I and II is from 0,2 to 5% by weight and the amount of compound III is from 0,2 to 5% by weight.

19. Method according to claim 16 wherein the total amount of compounds I and II is from 0,4 to 3% by weight and the amount of compound III is from 0,4 to 3 % by weight.

20. A concentrate, comprising  
 anionic compounds I, II and III as defined in claim 11 in  
 an total amount of 20-95% by weight  
 additional corrosion inhibitors in an amount of 0-30% by weight  
 additional lubricants in an amount of 0-30% by weight  
 water in an amount 5-80% by weight  
 other ingredients in an amount of 0-30% by weight,  
 the weight ratio between the compounds I and/or II and compound III being from 1:15 to 15:1

21. Concentrate according to claim 20 comprising  
 the anionic compounds I, II and III in an total amount of 50-90% by weight  
 the additional corrosion inhibitors in an amount of 0-15% by weight  
 the additional lubricants in an amount of 0-15% by weight  
 water in an amount of 10-50% by weight  
 the other ingredients in an amounts of 0-15% by weight,  
 the weight ratio between the compounds I and/or II and compound III being from 1:5 to 5:1.

22. Concentrate according to claim 21 wherein the total amount of the additional corrosion inhibitors, the additional lubricants and the other ingredients is from 5 to 40% by weight.

REMARKS


The specification has been amended to provide a cross-reference to the previously filed International Application. The claims have been amended to add claims 11-22 and cancel 1-10. Entry of the present amendment and favorable action on the above-identified application are earnestly solicited.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By

 #32868  
for Joseph A. Kolasch, #22,463

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JAK/rem  
2964-0106PD

(Rev. 02/12/01)

VERSION WITH MARKINGS SHOWING CHANGES MADE

IN THE CLAIMS:

Claims 1-10 have been canceled.

Claims 11-22 have been added.

2024-09-03



WO 00/42135

PCT/SE00/00035

# MECHANICAL WORKING IN THE PRESENCE OF A MULTI-PURPOSE COOLING LUBRICANT

The present invention relates to a multi-purpose aqueous cooling lubricant suitable for the mechanical working of many different metals and alloys. The cooling lubricant containing as essential components a phosphate ester compound and a dicarboxylic acid contributes to excellent corrosion inhibiting and lubrication properties.

The mechanical working of metals is often performed in the presence of an aqueous cooling lubricant. A disadvantage of many aqueous cooling lubricants is that they frequently contain an iron corrosion inhibitor, such as monoethanolamine, diethanolamine or triethanolamine, which has a detrimental effect and causes discoloration and dissolution when used with cobalt, copper, aluminum, lead or zinc or alloys thereof. Besides the corrosion, any dissolved metal may also constitute a human health and environmental hazard and is difficult to remove from water in the process of disposal of the cooling lubricant.

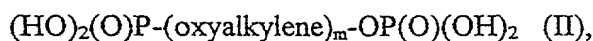
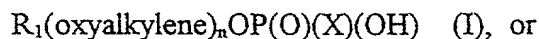
In order to mitigate the negative effects of alkanol amine, anionic surface active components with long aliphatic groups, such as groups with 14-44 carbon atoms have been added. Exemplary components are phosphate esters, fatty acids and dimer acids. Their protective action depends on the formation of water-insoluble, organic layers on the metal surfaces. If, however, dissolved di- or trivalent metals exist in the cooling lubricant, the anionic components will form water-insoluble salts with these metals ions. This may sometimes further increase the corrosion inhibiting effect, but it will also lead to the formation of undesirable sticky precipitation, which e.g. tends to interfere with the purification of the cooling lubricant. Another drawback is the difficulty to remove the hydrophobic layers formed on the metal surfaces. If they are not removed, they could cause problems in the subsequent surface treatments, for example pickling, phosphatizing, galvanizing or other metal depositing processes. The presence of the long chain anionic components may also cause undesirable foaming and scum.

US patent 4 315 889 discloses a method of reducing the release of cobalt by performing the metal working in the presence of a cooling lubricant containing, as an active component, a specific triazole or thiadiazole compound. However, since these active compounds are consumed in the presence of ethanolamines, the aqueous cooling lubricant has to be regularly upgraded.

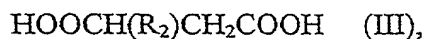
EP-A-0180561 describes the use of a tertiary alkanol amine compound for reducing the release of cobalt. According to the application the tertiary alkanol amine compound can advantageously be combined with carboxylic acids to further increase the protection against the release of cobalt and the corrosion of iron.

DE-OS-2 943 963 discloses the use of an alkanolamine salt of alkenyl succinic acid as corrosion inhibitor in aqueous solutions and US patent 4 670 168 describes a metalworking composition containing a water-soluble polyalkyleneglycol and a neutralised or partly neutralised alkenyl succinic acid.

According to the present invention it has now been found that the above mentioned problems may be reduced or eliminated by using a combination of a phosphate ester and a dicarboxylic acid as a lubricant and anti-corrosion agent in an aqueous metal working liquid, whereby the dissolution and discoloration of several metals, such as cobalt, copper, zinc, lead, aluminum and iron, and their alloys are effectively hampered. In more detail, the present invention relates to a process for the mechanical working of metals, which is performed in the presence of an aqueous cooling lubricant having a pH of 6-10 and containing a phosphate ester of the formula



where  $R_1$  is an alkyl group with 1-12 carbon atoms, oxyalkylene is a group containing 2-4 carbon atoms,  $n$  is a number from 1-20, preferably 4-15,  $X$  is hydroxyl, the group  $R_1\text{O}$  or the group  $R_1(\text{oxyalkylene})_n\text{O}$ , where  $R_1$ ,  $n$  and oxyalkylene have the above mentioned meanings, and  $m$  is a number from 4-40, preferably 5-20 or a salt thereof, and an alkenyl substituted succinic acid of the formula



where  $R_2$  is an aliphatic group with 4-10 carbon atoms, or a salt thereof, or a mixture of the compounds I, II and III. The total amount of compounds I and II is from 0,2 to 5% by weight, preferably 0,4-3% by weight and the amount of compound III is from 0,2 to 5% by weight, preferably 0,4-3% by weight. The salts of the phosphate ester and the succinic acid are preferably formed of monovalent cations, such as potassium and sodium.

In the phosphate esters of formulae I and II, the  $(\text{oxyalkylene})_n$  group and  $(\text{oxyalkylene})_m$  group respectively, are suitably selected in such a way that the esters will be water-soluble or easily dispersible in water. Preferably the  $(\text{oxyalkylene})_n$  group contains at least partially oxypropylene units and most preferably only oxypropylene units. The

aliphatic group  $R_1$  can be saturated or unsaturated, straight or branched and contains preferably 2-8 carbon atoms. The group X is preferably a hydroxyl or the group  $R_1(\text{oxyalkylene})_n\text{O}$ . Preferably the phosphate ester of formula I consists of at least 50% by weight of monoesters. In formula II the polyoxyalkylene chain preferably consists at least partially of oxyalkylene groups with 3-4 carbons atoms and m preferably is at least 6, since these diphosphate esters beside the corrosion inhibiting effect give a considerable contribution to the lubrication. Especially suitable are those diphosphate esters, which contain a polyoxypropylene chain with 8-15 oxypropylene units.

The succinic acid of formula III contains an aliphatic group  $R_2$  which can be a straight or branched alkenyl. Examples of alkenyl groups are octenyl, decenyl, di(isobutenyl) and tri(propenyl). Preferably the alkenyl group contains 7-9 carbon atoms. The succinic acids of formula III exhibit in addition to their excellent lubrication and anti-corrosion also low foaming, which is of essential importance in a metal working cooling lubricant.

The cooling lubricant can also contain a number of other additives, such as additional corrosion-inhibiting additives and lubricants, pH-regulating or controlling additives, bactericidal agents, viscosity-increasing additives, solubilizers, perfumes, colourants etc.

Examples of suitable additional corrosion inhibitors are amine compounds, such as triazole and thiadiazole compounds and inorganic compounds, such as alkali metal hydroxides and boric acid, and reaction products between boric acid and/or carboxylic acids and organic reactants, such as alkanol amines. The content of these additional corrosion inhibitors may be up to 3% by weight of the cooling lubricant.

Although the cooling lubricant containing the anionic surfactants I, II and III has an adequate lubrication ability for most applications it may be occasions where improved lubrication is desired. Examples of suitable lubricants to be incorporated into a cooling lubricant according to the invention are those selected from the group consisting of esters or amides of mono- or dicarboxylic acids having at least 12 carbon atoms in the acyl groups, organic aliphatic phosphate esters containing one or two aliphatic groups with 6-18 carbon atoms, nonionic alkylene oxide adducts with a molecular weight above 400, such as polypropylene glycols, glycols of randomly distributed propyleneoxy and ethyleneoxy groups and block polymers of propylene oxide and ethylene oxide, and mixtures thereof.

The content of these additional lubricants may be up to 3% by weight of the cooling lubricant ready for use.

The solubilizers are usually low molecular weight compounds containing at least one hydroxyl. The molecular weight is normally below 400. Examples of suitable solubilizers are propyleneglycol, methyl dipropyleneglykol, ethyl diethyleneglycol, butyl diethyleneglycol and butyl triethyleneglycol.

When preparing a cooling lubricant according to the invention, it is suitable to first prepare a concentrate, for example by first mixing the anionic compounds I, II and III and water, and then the supplementary ingredients. The amount of water is suitably between 5 and 80% by weight of the concentrate. A typical concentrate according to the invention has the following composition:

|                                 |                                    |
|---------------------------------|------------------------------------|
| anionic compounds I, II and III | 20-95, preferably 50-90% by weight |
| additional corrosion inhibitors | 0-30, preferably 0-15% by weight   |
| additional lubricants           | 0-30, preferably 0-15% by weight   |
| water                           | 5-80, preferably 10-50% by weight  |
| other ingredients               | 0-30, preferably 0-15% by weight,  |

the weight ratio between the compounds I and/or II and compound III being from 1:15 to 15:1, preferably from 1:5 to 5:1.

The total amount of the additional corrosion inhibitors, the additional lubricants and the other ingredients is often 5-40% by weight of the concentrate. Before the concentrate is used, it is diluted with water so that the cooling lubricant ready for use will have a total content of the anionic compounds I, II and III of 0.5-10% by weight, preferably 2-6% by weight.

The present invention is further illustrated by the following Example.

#### Example

Three water-based lubricants A, B and C were prepared by adding 20 grams of octenyl succinic acid, 20 grams of *n*-butyl-(C<sub>3</sub>H<sub>6</sub>O)<sub>10</sub>OPO<sub>3</sub>H<sub>2</sub>, or 10 grams of octenyl succinic acid and 10 grams of *n*-butyl-(C<sub>3</sub>H<sub>6</sub>O)<sub>10</sub>OPO<sub>3</sub>H<sub>2</sub>, respectively, to 980 grams of water of a water hardness of 17°dH. The pH value of the cooling lubricants were adjusted to 9 by addition of KOH. The lubrication and corrosion-inhibiting ability of the cooling lubricants were tested. The lubrication was determined by measuring the wear scar obtained in modified Timken machine using steel rings A4138 with an outer diameter of 35

mm. The tests were performed during 2 and 5 minutes at a temperature of 45°C. The corrosion of Fe, Al, Co, Cu and brass was determined by the following test methods.

Fe-corrosion tests were done by placing 30 grams of cast iron chips evenly spread on a circular filter paper with a diameter of 90 mm. 1.25 gram of one of the cooling lubricants was dispensed at the centre of the filter paper, which was placed in a plastic Petri dish and covered by a lid. The corrosion taken place after 24 hours was determined by visually inspection of the rust staining according to a scale, where 0= no corrosion, 1= one stain, 2= two or three stains, 3= more than three stains up to 10% of the paper surface discoloured, 4= between 10 and 25% of the paper surface discoloured, and 5= more than 25% of the paper surface discoloured.

Co and Cu corrosion tests were performed by assessing the amount of leached cobalt and copper obtained, when a 20 ml glass vial containing 5 glass beads, 5 mg of fine powder of cobalt or copper and 10 ml of one of the fluids was shaken for 7 days. The amount of cobalt or copper dissolved was measured by use of an atomic absorption spectrophotometer (AAS). Initial screening of the fluids was done by using analytical sticks from Merck and only samples, which were found to contain less than 30 ppm of cobalt or copper were subjected to AAS analysis.

Since brass and aluminium are often used in applications where visual appearance is important an immersion test was performed to show the degree of discoloration caused by the test solutions. Strips of 5 mm width and 60 mm length of each metal were placed in separate glass vials and tests solutions were added in an amount sufficient to cover half the length of the upright standing strips. The corrosion was visually determined after 7 days. The discoloration of the strips was measured according to a scale from 0 to 5, where 0 represent no corrosion, 1 indicate that up to 5% of the surface is black, 2 that 5-10% of the surface is black, 3 that 10-25% of the surface is black, 4 that 25-90% of the surface is black, and 5 that 90-100% of the surface is black.

The following results were obtained.

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Table 1 Corrosion and Timken Tests

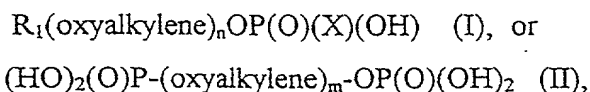
| Formulation<br>Symbol | Corrosion |    |       |    |    | Timken, mm |       |
|-----------------------|-----------|----|-------|----|----|------------|-------|
|                       | Fe        | Al | Brass | Co | Cu | 2 min      | 5 min |
| A                     | 0         | 0  | 0     | 0  | 5  | 0.97       | 1.07  |
| B                     | 4         | 0  | 1     | 0  | 10 | 0.83       | 1.17  |
| C                     | 0         | 0  | 0     | 0  | 5  | 0.83       | 1.03  |

From the results it is evident that the cooling lubricant C of the invention has excellent anti-corrosion properties and is superior to the comparison compositions as regards the lubrication ability.

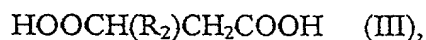
0989495 071304

## Claims

1. A method for the mechanical working of metals and alloys, characterised in that the method is performed in the presence of an aqueous cooling lubricant having a pH of 6-10 and containing a phosphate ester of the formula



where  $R_1$  is an alkyl group with 1-12 carbon atoms, oxyalkylene is a group containing 2-4 carbon atoms,  $n$  is a number from 1-20,  $X$  is hydroxyl,  $R_1\text{O}$  or  $R_1(\text{oxyalkylene})_n\text{O}$ , where  $R_1$ , oxyalkylene and  $n$  have the meanings mentioned above, and  $m$  is a number from 4-40, or a salt thereof, and a carboxylic acid of the formula



where  $R_2$  is an aliphatic group with 4-10 carbon atoms, or a salt thereof, or a mixture of any of the compounds I, II and III.

2. Method according to claim 2, characterised in that  $R_1$  contains 2-8 carbon atoms and the group  $(\text{oxyalkylene})_n$  contains at least partially oxypropylene units and  $n$  is a number from 4-15.

3. Method according to claim 2, characterised in that the phosphate ester of formula I is  $n$ -butyl- $(\text{C}_3\text{H}_5\text{O})_{10}\text{OPO}_3\text{H}_2$ .

4. Method according to any of the claims 1-3, characterised in that the phosphate ester of formula II is  $(\text{HO})_2(\text{O})\text{P}-(\text{oxypropylene})_{8-15}\text{OP}(\text{O})(\text{OH})_2$ .

5. Method according to any one of claims 1-4, characterised in that  $R_2$  in formula III is octenyl, decenyl, diisobutenyl or tripropenyl.

6. Method according to any one of claims 1-5, characterised in that the total amount of compounds I and II is from 0,2 to 5% by weight and the amount of compound III is from 0,2 to 5% by weight.

7. Method according to claim 6, characterised in that the total amount of compounds I and II is from 0,4 to 3% by weight and the amount of compound III is from 0,4 to 3 % by weight.

8. A concentrate, characterised in that it contains

|   |                  |
|---|------------------|
| anionic compounds I, II and III according to claims 1-5 | 20-95% by weight |
| additional corrosion inhibitors                         | 0-30% by weight  |

additional lubricants 0-30% by weight  
water 5-80% by weight  
other ingredients 0-30% by weight,

the weight ratio between the compounds I and/or II and compound III being from 1:15 to 15:1

9. Concentrate according to claim 8, characterised in that it contains

the anionic compounds I, II and III 50-90% by weight  
the additional corrosion inhibitors 0-15% by weight  
the additional lubricants 0-15% by weight  
water 10-50% by weight  
the other ingredients 0-15% by weight,

the weight ratio between the compounds I and/or II and compound III being from 1:5 to 5:1.

10. Concentrate according to claim 8 or claim 9, characterised in that the total amount of the additional corrosion inhibitors, the additional lubricants and the other ingredients is from 5 to 40% by weight.

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## COMBINED DECLARATION AND POWER OF ATTORNEY FOR PATENT AND DESIGN APPLICATIONS

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated next to my name; that I verily believe that I am the original, first and sole inventor (if only one inventor is named below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Insert Title:

MECHANICAL WORKING IN THE PRESENCE OF A MULTI-PURPOSE COOLING LUBRICANT

Fill in Appropriate  
 Information -  
 For Use Without  
 Specification  
 Attached:

the specification of which is attached hereto. If not attached hereto,  
 the specification was filed on \_\_\_\_\_ as  
 United States Application Number \_\_\_\_\_;  
 and amended on \_\_\_\_\_ (if applicable) and/or  
 the specification was filed on January 31, 2000 as PCT  
 International Application Number PCT/SE00/00035; and was  
 amended under PCT Article 19 on \_\_\_\_\_ (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representative or assigns more than twelve months (six months for designs) prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as follows.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

**Prior Foreign Application(s)****Priority Claimed**

Insert Priority  
 Information:  
 (if appropriate)

|                              |                            |   |  |                                |
|------------------------------|----------------------------|---|--|--------------------------------|
| <u>9900112-5</u><br>(Number) | <u>Sweden</u><br>(Country) | <u>January 18, 1999</u><br>(Month/Day/Year Filed) | <input checked="" type="checkbox"/><br>Yes | <input type="checkbox"/><br>No |
| _____<br>(Number)            | _____<br>(Country)         | _____<br>(Month/Day/Year Filed)                   | <input type="checkbox"/><br>Yes            | <input type="checkbox"/><br>No |
| _____<br>(Number)            | _____<br>(Country)         | _____<br>(Month/Day/Year Filed)                   | <input type="checkbox"/><br>Yes            | <input type="checkbox"/><br>No |
| _____<br>(Number)            | _____<br>(Country)         | _____<br>(Month/Day/Year Filed)                   | <input type="checkbox"/><br>Yes            | <input type="checkbox"/><br>No |

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional applications(s) listed below.

Insert Provisional  
 Application(s):  
 (if any)

|                               |                        |
|-------------------------------|------------------------|
| _____<br>(Application Number) | _____<br>(Filing Date) |
| _____<br>(Application Number) | _____<br>(Filing Date) |

All Foreign Applications, if any, for any Patent or Inventor's Certificate Filed More than 12 Months (6 Months for Designs) Prior to the Filing Date of This Application:

| Country | Application Number | Date of Filing (Month/Day/Year) |
|---------|--------------------|---------------------------------|
| _____   | _____              | _____                           |
| _____   | _____              | _____                           |

Insert Requested  
 Information:  
 (if appropriate)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States and/or PCT application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States and/or PCT application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to the patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

I hereby appoint the following attorneys to prosecute this application and/or an international application based on this application and to transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting patent based on instructions received from the entity who first sent the application papers to the attorneys identified below, unless the inventor(s) or assignee provides said attorneys with a written notice to the contrary:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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